LAHORE UNIVERSITY OF MANAGEMENT SCIENCES
Department of Electrical Engineering

EE240 Circuits I
Quiz 06 Solutions

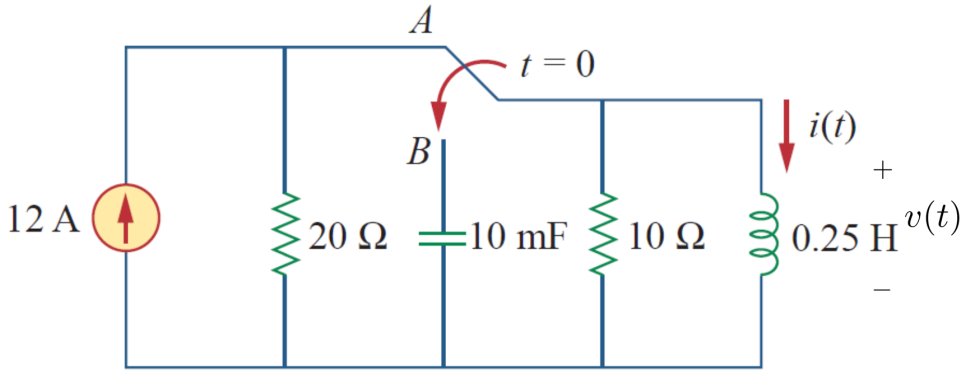
Name: _____

Campus ID: _____

Total Marks: 10
Time Duration: 20 minutes

Question 1 (10 marks)

In the circuit given below, the switch has been at position A for a long time before it is moved from A to B at $t = 0$.



(a) [2 marks] Determine $i(t)$ and $v(t)$ at $t = 0^+$.

Solution: $i(0^-) = i(0^+) = 12A$, $v(0^+) = 0V$

(b) [4 marks] Determine $\frac{di}{dt}$ and $\frac{dv}{dt}$ at $t = 0^+$.

Solution:

$$v(t) = 0.25\frac{di}{dt}, \quad \Rightarrow \quad \frac{di}{dt}(0^+) = 0\,A/s$$

$$(10m)\frac{dv}{dt} + \frac{v(t)}{10} + i(t) = 0 \Rightarrow \quad \frac{dv}{dt}(0^+) = -1200\,V/s$$

(c) [4 marks] Determine $\frac{d^2i}{dt^2}$ and $\frac{d^2v}{dt^2}$ at $t = 0^+$.

Solution:

$$\frac{dv}{dt} = 0.25\frac{d^2i}{dt^2}, \quad \Rightarrow \quad \frac{di}{dt}(0^+) = -4800\,A/s^2$$

$$(10m)\frac{d^2v}{dt^2} + \frac{1}{10}\frac{dv}{dt} + \frac{di}{dt} = 0 \Rightarrow \quad \frac{d^2v}{dt^2}(0^+) = 49.2\,kV/s^2$$